N-Way Demultiplexer

ABSTRACT

Cable systems vary dramatically in the number of channels that they have to support. The invention provides the ability to have anywhere from one up to 96 different channels of output, while freely intermixing the number of channels that are bonded together under this output. The invention allows one to select the number of channels to be bonded together onto the output arbitrarily. In the preferred embodiment of the invention, an output clock synchronizes an output CPU with an n-way demultiplexer to allow the demultiplexer to know which output is which. To do so, the invention provides a synchronization scheme in which a synchronization string is always written to channel zero before the output is allowed to be clocked. Once synchronization is established, each channel has its own word-length output buffer. Thus, each time the clock sends out a signal, a new word is put into the output buffer, unless it happens to be for channel zero which does not need a memory. An address counter controls the output buffer. When the address counter is counting it is pointing to one of the 95 by sixteen shift registers that are in the output buffers. For example, channel one is written with a first word, then channel two, then channel three, then channel four, and then channel five – up to channel 95. When the counter wraps around to zero, the synchronization string is expected. The address counter continues to point at

zero until the synchronization string is detected. Thus, the invention automatically re-synchronizes. While the data are written to the shift register, the output clock is performing a shift register function. Thus, the data are input in parallel and then shifted out in serial. On the first clock edge the zero bit is shifted out, on the next clock edge the one bit is shifted out – up through fifteen for each sixteen-bit shift register. By the time the shift register reaches fifteen and it is time to output the next bit, the system has already written the next word to that set output. Thus, there are 95 television channels in digital form that are output from the shift registers. In some cases it is desirable to have two or more channels on a single output. The invention uses the fact that there is storage for other channels next to a preceding channel. For example, consider an output 1 and an output 2, where data are stored into two shift registers. In the invention, the two shift registers are connected together, such that by the time the system finishes outputting the first word from output 1, it automatically starts outputting the word from output 2. This is accomplished by running a clock on output 1 and output 2 at twice the rate that the clock would normally run for just output 1. In this way, the system provides throughput for two channels while system synchronization is maintained within the system. Any number of channels may be bonded using this technique.